

MASSACHUSETTS STATE POLICE FORENSIC SERVICES GROUP

SAFETY MANUAL

Version 6.0

TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	RESPONSIBILITIES	4
2.1	Responsibilities of Management	4
2.2	Responsibilities of the Health and Safety Coordinator	4
2.3	Responsibilities of the Safety Committee	4
2.4	Responsibilities of All Personnel at the FSG	5
3	SAFETY INSPECTIONS AND AUDITS.....	5
3.1	Quarterly Laboratory Safety Inspections	5
3.2	Annual Audit	6
3.3	Safety Showers Inspections.....	6
3.4	Eyewash Inspections	6
3.5	AED Inspections	7
3.6	First Aid Kits Inspections.....	7
3.7	Fire Extinguisher Inspections.....	8
3.8	Spill Kit Inspections.....	8
4	GENERAL SAFETY PRACTICES	8
4.1	Universal Precautions	8
4.2	Standard Practices.....	9
5	EXPOSURE CONTROL PLAN	10
5.1	Introduction	10
5.2	Terms.....	10
5.3	Routes of Contamination	11
5.4	Personal Protective Equipment	11
5.5	Occupational Exposure and Post Exposure Procedure.....	12

5.6	Hepatitis B Vaccine.....	12
6	HAZARD COMMUNICATION PROGRAM	13
6.1	Introduction	13
6.2	Procurement of Chemicals.....	13
6.3	Storage of Chemicals	13
6.4	Chemical Inventory and Material Safety Data Sheets	14
6.5	Chemical Labeling.....	15
6.6	Hazardous and Biohazard Waste Disposal	15
7	CHEMICAL HYGIENE PLAN.....	16
7.1	Purpose	16
7.2	Definitions.....	16
7.3	Chemical Spills	19
7.4	Chemical Exposure.....	20
7.5	Flammables and Volatiles.....	20
7.6	Acids.....	21
7.7	Bases.....	21
7.8	Laser Safety	22
7.9	Compressed Gases	22
7.10	Chemical / Biological Exhaust Hoods	22
7.11	Biohazard Safety Cabinets / Laminar Flow Hoods.....	23
7.12	Lead Exposure.....	23
8	EMERGENCY RESPONSE / EVACUATION PLAN	24
8.1	Evacuation Plan	24
9	REVISION HISTORY	25
10	MANUAL APPROVAL	25

1 INTRODUCTION

The purpose of this safety policy is to provide every employee of the Forensic Services Group (FSG) with general guidelines for maintaining a safe work environment in all facilities and at all off site work locations including crime scenes. The laboratory safety program provides information and training to all members of the Forensic Services Group.

2 RESPONSIBILITIES

2.1 Responsibilities of Management

- 2.1.1 To keep facilities and equipment properly maintained in order to provide a safe work environment for all employees.
- 2.1.2 To implement reasonable steps to identify, eliminate and reduce exposure at FSG facilities to conditions which may cause accidental injuries or adversely affect an individual's health.

2.2 Responsibilities of the Health and Safety Coordinator

- 2.2.1 To chair the Safety Committee.
- 2.2.2 To review quarterly Laboratory Safety Inspections and resolve issues identified.
- 2.2.3 To direct the annual safety audits
- 2.2.4 To will report any health and safety concerns to the Director of the Forensic Services Group.

2.3 Responsibilities of the Safety Committee

- 2.3.1 To meet regularly as a committee to discuss appropriate safety issues and concerns and take appropriate action on safety related issues .
- 2.3.2 To work with all employees to implement appropriate safety policies and procedures.
- 2.3.3 To maintain the chemical inventories for all FSG locations.

- 2.3.4 To provide safety training to all employees annually.
- 2.3.5 To continually update and improve the FSG safety policies and procedures as appropriate.

2.4 Responsibilities of All Personnel at the FSG

- 2.4.1 All personnel are required to comply with the safety program including interns, temporary employee, and contract employees. All personnel share the responsibility of creating a safe work environment by complying with good safety practices and being familiar with the contents of this manual.
- 2.4.2 All personnel working with chemical, biological, radiation, nuclear or explosive hazards(CBRNE) are responsible for knowing how to safely handle these hazards. If, after training, the person is uncertainty of a hazard or safety procedure, a supervisor or a member of the Safety Committee should be consulted.
- 2.4.3 All personnel are responsible to conduct their work in a safe manner within the limits of their scientific knowledge, training and experience.
- 2.4.4 All personnel are responsible for wearing appropriate personal protective equipment (PPE) when required.
- 2.4.5 All personnel are required to participate in periodic self inspection of units and sections for safety and hazard assessments which may include quarterly unit safety checks documented on a Laboratory Safety Inspection Checklist.
- 2.4.6 All employees at the FSG are required to complete the annual safety training program. All safety training will be documented.
- 2.4.7 Employees, if present at the time, are required to respond to any safety drills, announced or unannounced.

3 SAFETY INSPECTIONS AND AUDITS

3.1 Quarterly Laboratory Safety Inspections

- 3.1.1 The Health and Safety Coordinator will assign employees to conduct quarterly laboratory safety inspections of each unit or section at each FSG facility.

- 3.1.2 The quarterly laboratory safety inspections should be completed by the assigned deadline and documented on the Laboratory Safety Inspection Checklist.
- 3.1.3 The completed checklist will be electronically sent to the Health and Safety Coordinator for review and appropriate action.
- 3.1.4 The completed checklists will be kept in the Quality Management System in the laboratory information management system.
- 3.1.5 Q1 is January 1 to March 31, Q2 is April 1 to June 30, Q3 is July 1 to September 30 and Q4 is October 1 to December 31.

3.2 Annual Audit

- 3.2.1 The annual safety audit of each facility will be conducted by the Health and Safety Coordinator and designees assigned by the coordinator.
- 3.2.2 If possible, the annual safety audit will be conducted in conjunction with the Quality Assurance Unit's internal audits.
- 3.2.3 All annual safety audits will be documented.

3.3 Safety Showers Inspections

- 3.3.1 All safety showers shall be tested quarterly.
- 3.3.2 All testing will be documented in the Safety Shower Log.
- 3.3.3 It is the responsibility of the unit supervisor to review the comments in the log and notify the Health and Safety Coordinator of any issues or concerns.
- 3.3.4 If the unit supervisor determines the safety shower is not working properly after consulting with the Health and Safety Coordinator, the unit supervisor will post the shower as "out of service".
- 3.3.5 The Health and Safety Coordinator will resolve any outstanding issues with the safety shower with facilities.

3.4 Eyewash Inspections

- 3.4.1 All eyewash stations shall be tested weekly.
- 3.4.2 All testing will be documented in the Eyewash Station Log.

- 3.4.3 It is the responsibility of the unit supervisor to review the comments in the log and notify the Health and Safety Coordinator of any issues or concerns.
- 3.4.4 If the unit supervisor determines the eye wash is not working properly after consulting with the Health and Safety Coordinator, the unit supervisor will post the eyewash as "out of service".
- 3.4.5 The Health and Safety Coordinator will resolve any outstanding issues with the eye wash with facilities.
- 3.4.6 If the eyewash consists of a portable eye wash station and not a plumbed eye wash station, the saline solution should be checked for an expiration date.

3.5 AED Inspections

- 3.5.1 All AEDs shall be checked monthly.
- 3.5.2 All monthly checks will be documented in the AED Log.
- 3.5.3 It is the responsibility of the Lead Supervisor/Unit Commander to review the comments in the log and notify the Health and Safety Coordinator of any issues or concerns.
- 3.5.4 If the Lead Supervisor/Unit Commander determines the AED is not working properly after consulting with the Health and Safety Coordinator, the Lead Supervisor/Unit Commander will post the AED as "out of service".
- 3.5.5 The Health and Safety Coordinator will resolve any outstanding issues with the AED with facilities.

3.6 First Aid Kits Inspections

- 3.6.1 All units should contain First Aid Kits that are stocked with basic first aid supplies.
- 3.6.2 All first aid kits should be easy to locate and readily accessible.
- 3.6.3 It is the responsibility of the unit supervisor to maintain the First Aid Kits in their unit.
- 3.6.4 The First Aid Kits will be checked during the quarterly laboratory safety inspections.

3.7 Fire Extinguisher Inspections

- 3.7.1 Portable extinguishers (Class A, B, C) shall be maintained in a fully charged and operable condition,
- 3.7.2 Extinguishers shall be conspicuously located where they will be readily accessible.
- 3.7.3 All employees shall be aware of the location of extinguishers within their units/sections and the common areas of their facility.
- 3.7.4 The fire extinguishers in all facilities will be checked annually
- 3.7.5 The annual checks will be documented on a tag attached to each extinguisher.
- 3.7.6 It is the responsibility of Facilities to schedule the annual check.
- 3.7.7 The fire extinguisher inspection date will be recorded during the quarterly laboratory safety inspections.

3.8 Spill Kit Inspections

- 3.8.1 All units have spill kits.
- 3.8.2 It is the responsibility of the unit supervisor to replace any items that may have been used or that are expired.
- 3.8.3 The spill kit will be checked during the quarterly laboratory safety inspections.

4 GENERAL SAFETY PRACTICES

4.1 Universal Precautions

- 4.1.1 The term "universal precautions" refers to a preventative exposure strategy for employees. This strategy includes specific precautions including an array of work practices such as the use of personal protective equipment. The term "universal" means that all Blood or Other Potentially Infectious Material (OPIM) are considered to be infectious material regardless of the perceived status of the source individual.
- 4.1.2 Universal precautions shall be exercised by all employees who respond to crime scenes, handle evidence, and work in a laboratory unit or section.

- 4.1.3 Administrative employees may accidentally be exposed to blood or OPIM and must follow the same standard practices as those employees who work in a laboratory unit or section.

4.2 Standard Practices

- 4.2.1 Good laboratory practice indicates employees should not work in a facility alone.
- 4.2.2 No open toes shoes should be worn while working in the laboratory.
- 4.2.3 No eating, drinking, food storage, application of cosmetics, or handling of contact lenses is permitted in laboratory areas, where evidence is handled or in the field. Food or beverages shall not be stored in laboratory refrigerators, freezers, shelves, cabinets, or on counter/bench tops.
- 4.2.4 Case files and evidence are not permitted in designated eating areas
- 4.2.5 Work surfaces should be protected by clean paper while processing evidence.
- 4.2.6 Protective paper must be removed and replaced when contaminated and at the completion of a shift.
- 4.2.7 Work surfaces should be decontaminated with a disinfectant immediately before and after processing evidence or specimens containing blood or other potentially infectious material(OPIM). Contact time between disinfectant and surface will be 5 minutes minimum.
- 4.2.8 Utensils and small items such as pipettes may be autoclaved to minimize the risk of exposure to blood or OPIM. Placing these items under UV light for approximately 15 minutes will help to inactivate potential blood-borne pathogens and further minimize risk of exposure.
- 4.2.9 Spills and accidental breakage shall be immediately cleaned and disinfected.
- 4.2.10 If something is irritating your eyes, promptly flush eyes with water for at least 15 minutes and seek medical attention if needed.
- 4.2.11 If something is spilled on you, promptly flush affected area with water for a minimum of 15 minutes and remove contaminated clothing. If symptoms persist after washing seek medical attention.

- 4.2.12 Call Poison Control Center at 1-800-682-9211 as necessary
- 4.2.13 Biologically contaminated sharps are to be placed immediately, or as soon as possible, into a sharps container.
- 4.2.14 Biologically contaminated reusable glassware and plastic ware should be washed and cleaned with disinfectant
- 4.2.15 If outside contamination of the primary container occurs, the primary container shall be placed within a secondary container which prevents leakage during the handling, processing, storage, or transport of the evidence while maintaining the integrity of the biological evidence.
- 4.2.16 Uncontaminated broken glass shall be placed in a designated glass disposal box.
- 4.2.17 All containers of regulated waste, refrigerators and freezers containing blood or OPIM, and other containers used to store or transport blood or OPIM must be affixed with biohazard labels.
- 4.2.18 Regularly inspect and decontaminate reusable receptacles such as buckets, pails, cans, and carts.

5 EXPOSURE CONTROL PLAN

5.1 Introduction

- 5.1.1 The FSG shall provide information, appropriate equipment, and training to personnel who may come in contact with biological substances during the performance of their duties.

5.2 Terms

- 5.2.1 Disinfectant: 0.5% Sodium Hypochlorite solution (1 part bleach: 9 parts water) shall be made fresh daily or may be substituted with manufacturer recommended effective disinfectant.
- 5.2.2 OPIM: Other Potentially Infectious Materials. These may include blood and blood components, vomit, urine, feces, saliva, semen, vaginal secretions, and any fluid one cannot identify.

5.3 Routes of Contamination

- 5.3.1 Inhalation : Infectious agents may become airborne through incidents such as spillage, breakage, centrifuging, vortexing, or removing caps from a container. Proper ventilation or breathing protection is important to reduce the danger of inhaling infectious agents.
- 5.3.2 Ingestion: Smoking, eating or drinking after handling evidence and prior to washing hands may result in oral ingestion of infectious agents or hazardous chemicals. Mouth pipetting, placing pens or pencils in the mouth or hand contact with mucous membranes may also result in contamination.
- 5.3.3 Absorption: Open cuts or scratches on the skin provide a point of entry for an infectious agent. Penetration through intact skin is possible by some infecting agents and chemicals.
- 5.3.4 Injection: Accidental needle sticks provide a point of entry for infectious agents.

5.4 Personal Protective Equipment

- 5.4.1 Personal Protective Equipment (PPE) should be chosen based on the anticipated exposure to blood or OPIM. The PPE shall be considered appropriate only if it does not permit blood or OPIM to pass through or reach the employee's clothing, skin, eyes, mouth, or other mucous membranes under normal conditions of use for the duration of time which the equipment will be used.
- 5.4.2 All employees, temporary technicians, and interns must wear laboratory coats in laboratory work areas when performing laboratory work.
- 5.4.3 PPE must be worn at all crime scenes.
- 5.4.4 Eye protection must be worn at all times when handling biologically hazardous materials including blood and other body fluids. Protective masks in combination with safety eyewear (glasses with solid side shields or chin length face shields) are recommended. A mask worn in combination with eye protection minimizes mucous membrane exposure generated via splashes, spray, spatter, or droplets of blood or OPIM.
- 5.4.5 Double gloving is recommended when handling any item containing wet blood or OPIM.

- 5.4.6 When PPE is removed, it shall be placed in an appropriately designated area for storage, washing, decontamination or disposal.

5.5 Occupational Exposure and Post Exposure Procedure

- 5.5.1 The risk of occupational exposure to blood borne pathogens may be enhanced in an uncontrolled environment, such as a crime scene.
- 5.5.2 Due to the nature of handling evidence, every laboratory employee will have a reasonably anticipated exposure to blood borne pathogens or OPIM. For this reason all job duties within the FSG may have some degree of risk with respect to occupational exposure.
- 5.5.3 If an employee incurs blood borne pathogen exposure to skin or mucous membranes, then those areas shall be washed or flushed with water as soon as feasible following contact.
- 5.5.4 If necessary, the employee should seek immediate medical attention at an emergency room.
- 5.5.5 The incident should be reported to their supervisor and the Health and Safety Coordinator.
- 5.5.6 The Notice of Injury /Illness Report should be completed with 48 hours of an incident and forwarded to Human Resources. Guidelines in MSP Orders Admin 11B and General-05 for sworn employees should also be followed.
- 5.5.7 The employee will follow-up with Human Resources Division as outlined in the Injury Reporting Forms and Contacts.
- 5.5.8 The Unprotected Exposure Form should be sent to the State Police Academy Designated Infectious Control Officers (DICO) for both sworn and civilian employees.
- 5.5.9 The Director of Human Resources or the Designated Infectious Control Officer (DICO) shall obtain and provide the employee with a copy of the evaluating health care professional's written opinion within 15 days of the completion of the evaluation.
- 5.5.10 No medical records will be kept at the FSG. The Director of Human Resources is responsible for maintaining medical records.

5.6 Hepatitis B Vaccine

- 5.6.1 The Department of State Police shall make the Hepatitis B Vaccine series available to all Forensic Services Group employees. New employee will complete the Hepatitis B Vaccination Form which indicates they were offered the opportunity to have the vaccine. It is the unit supervisor's responsibility to have the form completed by the new employee.
- 5.6.2 The Department will ensure that post exposure follow-up is offered and/or provided to employees who have had an exposure.

6 HAZARD COMMUNICATION PROGRAM

6.1 Introduction

- 6.1.1 Chemicals may pose a wide range of health hazards (such as irritation, sensitization, and carcinogenicity) and physical hazards (such as flammability, corrosion, and reactivity). The Hazard Communication Program is designed to ensure that information about these hazards and associated protective measures are known to all employees.
- 6.1.2 The Hazard Communication Program (HCP) shall document the receipt, storage, use and disposal of chemicals within the FSG.

6.2 Procurement of Chemicals

- 6.2.1 All chemicals purchases must be comply with the Protocol for the Purchase of Goods, Services, Inventory & Grants.
- 6.2.2 Only the minimal amount of chemicals needed should be ordered.

6.3 Storage of Chemicals

- 6.3.1 All chemicals are stored in appropriate containers based on their chemical properties.
- 6.3.2 Chemical storage shall be limited within the laboratory to the smallest practical quantity needed for effective operations.
- 6.3.3 Incompatible chemical groups should not be store in close proximity.
- 6.3.4 No liquid chemicals should be stored above eye level.
- 6.3.5 Corrosives, oxidizers, flammables, radioactive and explosive chemicals shall be appropriately marked and stored in marked cabinets.

- 6.3.6 All gases shall be appropriately stored and marked.
- 6.3.7 Waste chemicals shall be deposited in labeled waste containers.
- 6.3.8 Heavier items shall be stored on lower shelves, preferably no higher than an individual can reach without the use of a ladder or stool.
- 6.3.9 Hood are not the appropriate place to store chemicals.
- 6.3.10 Outdated and expired chemicals shall be disposed of properly.
- 6.3.11 It is the responsibility of the Unit Supervisor to ensure all chemicals are properly stored within the unit.

6.4 Chemical Inventory and Material Safety Data Sheets

- 6.4.1 Each unit should have a complete and accurate chemical inventory. It is the responsibility of the Unit Supervisor or designee to maintain the chemical inventory.
- 6.4.2 The Unit Supervisor, or designee, shall complete an annual chemical inventory of all chemicals currently in use in their units.
- 6.4.3 The Unit Supervisors, or designees, shall compare the chemical inventory to the Material Safety Data Sheets(MSDS) maintained in their unit. The MSDSs may be kept in a binder or in electronic format.
- 6.4.4 It is the responsibility of the Unit Supervisor to obtain any MSDSs for chemicals that are not included in the binder.
- 6.4.5 The Annual Chemical Inventory and MSDS Review will be documented.
- 6.4.6 The Unit Supervisor will convey to all unit employees where the chemical inventory as well as the MSDSs for the unit are maintained.
- 6.4.7 It is the responsibility of the Unit Supervisor to advise employees in the unit about safety issues associated with new chemicals in the workplace before they are used.
- 6.4.8 It is the responsibility of the employee to read and review the MSDSs in their unit.
- 6.4.9 It is the responsibility of the employee to be familiar with the manufacturer's recommendations/precautions on the label prior to using the chemical.

- 6.4.10 If a chemical is no longer in use, the MSDS can be removed from the unit and sent to the Health and Safety Coordinator. The date the chemical was removed from use should be noted on the top of the front page of the MSDS. The name of the supervisor removing the chemical should also be noted..
- 6.4.11 All MSDSs must be maintained for 30 years after the chemical is no longer in use.
- 6.4.12 Employees will receive annual training on topics to include chemical hazards and MSDSs.

6.5 Chemical Labeling

- 6.5.1 Labeling is required on containers of more than one gallon or five pounds containing hazardous chemicals for which an MSDS has been prepared by the manufacturer.
- 6.5.2 The label must contain the name of any chemical(s) in the product at a concentration greater than 1% and for any carcinogens at a concentration greater than 0.1%.
- 6.5.3 The label must include any serious health or safety hazards associated with this chemical.
- 6.5.4 Manufacturer's labels will typically meet these requirements.

6.6 Hazardous and Biohazard Waste Disposal

- 6.6.1 Hazardous chemical waste should be stored in appropriate storage containers and properly segregated and labeled.
- 6.6.2 Each Unit supervisor is responsible for designating an area for the storage of hazardous and biohazard waste in their unit.
- 6.6.3 Broken or disposable glassware or sharps previously contaminated with blood or OPIM should be discarded in a puncture-resistant, leak-proof container labeled "biohazard" and disposed of as biohazard waste.
- 6.6.4 The Health and Safety Coordinator will schedule waste pickup by a contracted vendor.
- 6.6.5 Waste pickup documentation must be forwarded to the Administration Unit for archiving.

7 CHEMICAL HYGIENE PLAN

7.1 Purpose

The chemical hygiene plan addresses general and specific hazards that exist within the FSG. This plan will assist employees at minimizing, controlling and avoiding these hazards.

7.2 Definitions

- 7.2.1 **Acid.** A compound that undergoes dissociation in water with the formation of hydrogen ions. Acids have pH values below 7 and will neutralize bases or alkaline media. Acids will react with bases to form salts. Acids cause severe skin and eye burns.
- 7.2.2 **Alkali.** (Also referred to as a base) - A compound that has the ability to neutralize an acid and form a salt. Alkalis have pH values above 7 to 14. Alkalis with pH values between 12 to 14 are considered to be corrosive (caustic) and will cause severe damage to the skin, eyes and mucous membranes. Common strong alkalis are sodium and potassium hydroxide.
- 7.2.3 **Autoignition Temperature.** The lowest temperature at which a flammable gas or vapor-air mixture will spontaneously ignite without spark or flame. Vapors and gases will spontaneously ignite at a lower temperature in oxygen than in the air. The autoignition temperature may also be influenced by the presence of catalytic substances. Materials should not be heated to greater than 80% of the autoignition temperature.
- 7.2.4 **Boiling Point (BP).** The temperature at which a liquid changes to a vapor state, at a given pressure; usually expressed in degrees of Fahrenheit or Centigrade at sea level pressure (760 mm Hg or one atmosphere). Flammable materials with low boiling points generally present special fire hazards.
- 7.2.5 **Carcinogenicity.** The complex process whereby normal body cells are transformed to cancer cells.
- 7.2.6 **Chronic Toxicity.** Adverse effects resulting from repeated doses or exposures to a substance over a relatively prolonged period of time.
- 7.2.7 **Evaporation Rate.** The ratio of the time required to evaporate a measured volume of a liquid to the time required to evaporate the same volume of a reference liquid (butyl acetate, ethyl ether) under ideal test conditions; The

higher the ratio, the slower the evaporation rate. The evaporation rate can be useful in evaluating the health and fire hazards of a material.

- 7.2.8 **Explosive Limits.** The range of concentrations of a flammable gas or vapor (percent by volume in air) in which explosion can occur if an ignition source is present. Also see Flammable Limits, LEL, and UEL.
- 7.2.9 **Flammable.** A material which is easily ignited and burns with extreme rapidity. The two primary measures of this physical hazard are the flashpoint and the autoignition temperature.
- 7.2.10 **Flashback.** Occurs when flame from a torch burns back into the tip, the torch, or the hose. It is often accompanied by a hissing or squealing sound with a smoky or sharp-pointed flame.
- 7.2.11 **Flashpoint.** The minimum temperature at which a liquid gives off a vapor in sufficient concentration to form an ignitable mixture in air or oxygen.
- 7.2.12 **Hazard.** The inherent capacity of a substance to cause an adverse effect.
- 7.2.13 **Ignitable.** A solid, liquid or compressed gas which is capable of being set afire.
- 7.2.14 **Inhalation.** Breathing in of a substance in the form of a gas, vapor, fume, mist, or dust.
- 7.2.15 **LEL or LFL - Lower Explosive Limit or Lower Flammable Limit.** Lowest concentration of the substance in air (usually expressed in percent by volume) that will produce a flash or fire when an ignition source (heat, electric arc, or flame) is present. At concentrations lower than the LEL, propagation of a flame will not occur in the presence of an ignition source. Also see UEL.
- 7.2.16 **Melting Point.** The temperature at which a solid substance changes to a liquid state.
- 7.2.17 **Mutagen.** A substance or agent capable of altering the genetic material in a living cell (mutation)
- 7.2.18 **NFPA.** The National Fire Protection Association is an international membership organization which promotes fire protection and prevention and establishes safeguards against loss of life and property by fire.

- 7.2.19 **NIOSH.** The National Institute for Occupational Safety and Health is a part of the Centers for Disease Control and Prevention, U.S. Public Health Service, U.S. Department of Health and Human Services.
- 7.2.20 **NTP.** The National Toxicology Program is a component of the U.S. Public Health Service. The NTP publishes the Annual Report on Carcinogens.
- 7.2.21 **Odor Threshold.** The lowest concentration of a substance in air that can be detected by smell.
- 7.2.22 **Oxidation.** A change in a chemical characterized by the loss of electrons.
- 7.2.23 **PEL - Permissible Exposure Limit.** A legally enforceable occupational exposure limit established by OSHA, usually measured as an eight-hour time-weighted average, but also may be expressed as a ceiling concentration exposure limit.
- 7.2.24 **ppm.** Parts per million; the proportion (by volume) of a gas or vapor per million parts of air; also the concentration of a chemical in a liquid or solid form.
- 7.2.25 **Reactivity.** A substance's susceptibility to undergo a chemical reaction or change that may result in dangerous side effects, such as an explosion, burning, and corrosive or toxic emissions.
- 7.2.26 **Risk.** The probability that an adverse effect will occur.
- 7.2.27 **Solubility.** The ability of a substance to be dissolved in a solvent. Solubility is expressed according to the solvent (e.g., solubility in water, solubility in acetone, etc.).
- 7.2.28 **STEL.** Short-Term Exposure Limit see TLV.
- 7.2.29 **Teratogen.** A substance that can cause malformations or alterations in the appearance or function of a developing embryo.
- 7.2.30 **TLV - Threshold Limit Value.** The occupational exposure limit published by the American Conference of Governmental Industrial Hygienists (ACGIH).
- 7.2.31 **Toxic Substance.** Any substance that can cause injury or illness, or which is suspected of being able to cause injury or illness under some conditions.

- 7.2.32 **Toxicity.** A relative property of a chemical agent that refers to a harmful effect on some biological mechanism and the conditions under which this effect occurs.
- 7.2.33 **UEL or UFL.** Upper explosive limit or upper flammable limit; the highest concentration of a vapor or gas (highest percentage of the substance in air) that will produce a flash of fire when an ignition source (e.g., heat, arc, or flame) is present. At higher concentrations, the mixture is too "rich" to burn; also see LEL.
- 7.2.34 **Unstable.** Tending toward decomposition or other unwanted chemical change during normal handling or storage.
- 7.2.35 **Vapor density.** The weight of a vapor or gas compared to the weight of an equal volume of air is an expression of the density of the vapor or gas. Materials lighter than air (e.g., acetylene, methane, hydrogen) have vapor densities less than 1.0. Materials heavier than air (e.g., propane, hydrogen sulfide, and ethane) have vapor densities greater than 1.0. All vapors and gases will mix with air, but the lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gases are likely to concentrate in low places along or under floors, in sumps, sewers, manholes, trenches, and ditches where they may create fire or health hazards.
- 7.2.36 **Vapor pressure.** Pressure exerted by a saturated vapor above its liquid in a closed container.
- 7.2.37 **Volatility.** The tendency or ability of a liquid or solid material to form a gaseous form at ordinary temperatures. Liquids such as alcohol and gasoline, because of their tendency to evaporate rapidly, are called volatile liquids.

7.3 Chemical Spills

- 7.3.1 Spill kits are located in every unit.
- 7.3.2 An employee should never take unnecessary risks when containing a spill.
- 7.3.3 Immediately alert all personnel in the area.
- 7.3.4 The Unit Supervisor shall notify Facilities if the HVAC system should be shut off to contain fumes.
- 7.3.5 If necessary, evacuate the area and the building.

- 7.3.6 Check the MSDS located in the unit for assistance.
- 7.3.7 Obtain additional technical assistance as necessary from Chemtrex 24 Hour Chemical hotline. 1-800-424-9300.
- 7.3.8 If the suspected substance is flammable, extinguish all ignition sources.
- 7.3.9 When possible, confine the spill, but not if it would pose a safety threat.
- 7.3.10 The absorbent material should be distributed evenly over the spill to be effective.
- 7.3.11 Absorbents used during the clean-up shall be disposed of appropriately.
- 7.3.12 Use appropriate PPE during clean up procedures.
- 7.3.13 Always take precautions to minimize the chemical exposure incident.

7.4 Chemical Exposure

- 7.4.1 Acute chemical exposure can occur when an individual is exposed to an extremely hazardous amount of a chemical in a short period of time. This type of exposure requires immediate medical attention.
- 7.4.2 Chronic chemical exposure occurs when an individual is exposed to low levels of a hazardous material over a long period of time. This type of exposure has symptoms developing long after the exposure has occurred.
- 7.4.3 Headache, nausea, dizziness and skin irritation may indicate acute chemical exposure. Leave the area until a hazard assessment has been performed. Seek medical attention as necessary.
- 7.4.4 If an employee has had a chemical exposure incident, use laboratory safety equipment to minimize the injury to the person.
- 7.4.5 If an employee has been overcome by chemical vapors, get the person to fresh air immediately and seek medical attention as necessary.

7.5 Flammables and Volatiles

- 7.5.1 Flammables will be stored away from open ignition sources.
- 7.5.2 Always store flammables away from oxidizing agents

7.5.3 Volatile chemicals should only be used in the hood or with proper respiratory equipment.

7.5.4 When possible, substitute solvents that are not flammable or toxic.

7.6 Acids

7.6.1 Acids should always be stored in cool, dry well vented acid storage cabinets away from sunlight and rapid temperature changes

7.6.2 Wear appropriate person protective equipment including gloves, lab coats, safety glasses or goggles when handling acids.

7.6.3 Reduce potential respiratory exposure by working with acids in vented hoods.

7.6.4 Always add acid to water.

7.6.5 Check equipment compatibility before working with acids.

7.6.6 Acid neutralizers are contained in each spill kit if needed.

7.6.7 Acids should always be separated from strong bases, active metals and chemicals which could generate toxic gases upon contact.

7.7 Bases

7.7.1 Bases are extremely corrosive to tissue and should be handled with caution.

7.7.2 Commonly used ammonium hydroxide and anhydrous ammonia are volatile bases that should be handled in vented hoods.

7.7.3 Check equipment compatibility before working with bases.

7.7.4 Wear appropriate person protective equipment including gloves, lab coats, safety glasses or goggles.

7.7.5 Bases neutralizers are contained in each spill kit if needed to contain a spill.

7.7.6 When exposed skin comes into contact with bases, the skin may feel slippery or soap like. The skin should be flushed with large amounts of water. If necessary, a 5% solution of boric acid or vinegar (weak acid) can be used to neutralize the caustic substance.

7.7.7 Bases should always be separated from acids.

7.8 Laser Safety

7.8.1 Lasers are embedded in laboratory instrumentation, hand held scanners and alternate light sources.

7.8.2 LASER is an acronym which stands for Light Amplification by Stimulated Emission of Radiation. The laser produces an intense, highly directional beam of light.

7.8.3 The human body is vulnerable to the output of certain lasers, and under certain circumstances, exposure can result in damage to the eye and skin.

7.8.4 Always avoid direct exposure to the laser beam.

7.8.5 Always wear appropriate PPE including eye protection when using instrumentation containing lasers.

7.9 Compressed Gases

7.9.1 Store cylinders upright, secured in position and in designated areas away from sources of heat and direct sunlight.

7.9.2 Oxygen cylinders shall never be stored near highly combustible materials or near any other substances likely to cause or accelerate fire.

7.9.3 Leave the valve protective cap in place on cylinders until they are secured in place and ready for use.

7.9.4 Always close cylinder valves and cap before moving cylinders.

7.9.5 Close the valves, replace the protective caps and tags on empty cylinders before returning them to the supplier.

7.10 Chemical / Biological Exhaust Hoods

7.10.1 All exhaust hoods are vented to the outside.

7.10.2 The vent ducts and fans must be kept clean and clear of obstructions.

7.10.3 The hoods must remain on at all times when chemicals are inside the hood or when work is being done.

- 7.10.4 The hood sash should be kept at the working position except when necessary to access the materials in the hood.
- 7.10.5 The hoods should not be used as a storage area for stock or bulk chemicals.
- 7.10.6 It is the responsibility of facilities to have the exhaust hoods checked annually with a flow meter. Test results should be forwarded to the Health and Safety Coordinator by facilities.
- 7.10.7 If a hood is not operating properly, an out of service sign will be placed on the hood and facilities will be notified.

7.11 Biohazard Safety Cabinets / Laminar Flow Hoods

- 7.11.1 Biohazard safety cabinets are not ducted to the outside of the building.
- 7.11.2 Hazardous chemicals should not be used in these cabinets.
- 7.11.3 Biohazard safety cabinets are used for protection from exposure and contamination when handling potentially infectious materials.
- 7.11.4 The biohazard safety cabinets should be cleaned with a disinfectant solution after use.
- 7.11.5 All filters should be changed in accordance with manufacturer's recommendation by the Unit Supervisor's designee.

7.12 Lead Exposure

- 7.12.1 Employees must wear appropriate personal protective equipment (e.g. hearing protection, lab coats and goggles).
- 7.12.2 The room in which test firing occurs will be appropriately ventilated, lead-tested and professionally cleaned as necessary.
- 7.12.3 When possible, lead free ammunition should be used.
- 7.12.4 FIS employees shall be offered to participate in the regular blood-level testing program to ensure that elevated blood-levels have not occurred.

8 EMERGENCY RESPONSE / EVACUATION PLAN

8.1 Evacuation Plan

- 8.1.1 A wide variety of emergencies both man-made and natural, may require a workplace to be evacuated. These emergencies include - fires, explosions, floods, earthquakes, hurricanes, tornadoes, toxic material releases, radiological and biological accidents, civil disturbances and workplace violence.
- 8.1.2 Every employee should be familiar with the evacuation routes that are posted in each facility.
- 8.1.3 In case of a fire, activate the fire alarm system and exit the building.
- 8.1.4 Exit the building and proceed to the Evacuation Assembly area for your facility and make yourself know to your Supervisor.
- 8.1.5 If you have a nonemployee in your area when there is an evacuation, it is the responsibility of the employee escort to assist the nonemployee out of the facility.
- 8.1.6 Supervisors are responsible for instructing new employees where the evacuation assembly area is for the employee in case of an evacuation.
- 8.1.7 Supervisors are responsible for accounting for all employees and other individuals that may be in their unit at the time of the emergency.
- 8.1.8 Supervisors are responsible for giving the highest ranking sworn or civilian staff member present at the facility information on anyone who is not accounted for so the information can be conveyed to the fire department.
- 8.1.9 Provide whatever assistance you can those who may be injured.

9 REVISION HISTORY

REVISION DATE	VERSION	Authority	TOTAL PAGES	REVISION
Pre 2000	1.0	Safety Committee		original
~2/00	2.0	Safety Task Group		Updated
8/1/05	3.0	Safety Task Group		Updated
8/10/07	4.0	Safety Task Group, Rebecca J. Post, SGT Mary Ritchie	58	Reformatted, revised language to include Forensic Services System
10/22/07	4.1	Safety Task Group, Rebecca J. Post, SGT Mary Ritchie	61	Revised language to include Forensic Services Group; updated Exposure Forms
3/23/09	5.0	Beth Saucier, Jessica Brown, Sgt. Mary Ritchie	59	Condensed wording, added Evacuation Protocol, removed outdated information
9/	6.0			Major revision.

10 MANUAL APPROVAL

Approved by:

COMMANDER OF FORENSIC SERVICES GROUP

DATE:

FORENSIC SERVICES GROUP DIRECTOR

DATE:

HEALTH AND HEALTH AND SAFETY COORDINATOR

DATE

Massachusetts State Police Forensic Services Group
Safety Task Group
Safety Manual, v. 6.0
Effective: DRAFT

FSG-SAF-D001-V.6.0-

Authority: Director
Page 25 of 25